

# Effect of Televised, Tobacco Company—Funded Smoking Prevention Advertising on Youth Smoking-Related Beliefs, Intentions, and Behavior

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The tobacco industry has actively attempted to remake its public image in response to evidence that it marketed products to youth and misled the public about smoking health risks.<sup>1,2</sup> This effort has included public education campaigns to communicate that youths should not smoke.<sup>3</sup> In December of 1998, Philip Morris launched a national \$100 million television campaign the company described as targeted to youths aged 10–14 years.<sup>4</sup> The primary message was that youths do not need to smoke to fit in socially with their peers, and the campaign delivers the slogan “Think. Don’t Smoke.” Although this campaign ended on US television in January 2003, the ads continue to be broadcast in other countries.<sup>5</sup> In October 1999, and with a budget of around \$13 million,<sup>6</sup> Lorillard Tobacco Company also launched a US-televised youth smoking prevention campaign with the slogan, “Tobacco is Whacko if You’re a Teen.”<sup>4</sup>

In mid-July 1999, Philip Morris launched a campaign that emphasized parental responsibility for talking to children about smoking; the slogan was “Talk. They’ll Listen.”<sup>7</sup> This parent-focused youth smoking prevention campaign has featured a variety of television ads and continues today. The overt message of these ads is that parents should talk to their children about not smoking.

Few studies have examined the potential effect of youth-focused tobacco company-sponsored advertising. Of those, most have only assessed immediate appraisals of the advertisements by youths,<sup>8,9,10</sup> or the relation between ads and attitudes thought to be predictive of smoking behavior change,<sup>11</sup> rather than smoking behavior itself. No studies have examined the effects of tobacco company parent-focused advertising on youth. Because advertising that may influence youth

**Objective.** To relate exposure to televised youth smoking prevention advertising to youths’ smoking beliefs, intentions, and behaviors.

**Methods.** We obtained commercial television ratings data from 75 US media markets to determine the average youth exposure to tobacco company youth-targeted and parent-targeted smoking prevention advertising. We merged these data with nationally representative school-based survey data (n = 103 172) gathered from 1999 to 2002. Multivariate regression models controlled for individual, geographic, and tobacco policy factors, and other televised antitobacco advertising.

**Results.** There was little relation between exposure to tobacco company-sponsored, youth-targeted advertising and youth smoking outcomes. Among youths in grades 10 and 12, during the 4 months leading up to survey administration, each additional viewing of a tobacco company parent-targeted advertisement was, on average, associated with lower perceived harm of smoking (odds ratio [OR] = 0.93; confidence interval [CI] = 0.88, 0.98), stronger approval of smoking (OR = 1.11; CI = 1.03, 1.20), stronger intentions to smoke in the future (OR = 1.12; CI = 1.04, 1.21), and greater likelihood of having smoked in the past 30 days (OR = 1.12; CI = 1.04, 1.19).

**Conclusions.** Exposure to tobacco company youth-targeted smoking prevention advertising generally had no beneficial outcomes for youths. Exposure to tobacco company parent-targeted advertising may have harmful effects on youth, especially among youths in grades 10 and 12. (*Am J Public Health.* 2006;96:2154–2160. doi:10.2105/AJPH.2005.083352)

smoking has also been broadcast at various times and intensities by tobacco control programs,<sup>12</sup> it is a complicated matter to establish the relative influence of tobacco company-sponsored advertising.

The objective of this study was to assess the relation between exposure to tobacco company youth smoking prevention advertising and youth smoking-related beliefs, intentions, and behavior in a representative sample of American secondary school students. The study includes youth-targeted and parent-targeted advertising. The study sample included the primary target age group of the youth-targeted ads (grade 8, mean age 14 years), as well as older youths in grades 10 and 12 (mean ages 16 and 18 years, respectively). We used objective media monitoring data to measure potential exposure of youths to different sources of advertising, as opposed to self-reported measures of exposure that

can be correlated with openness to change in smoking behavior.<sup>13</sup>

## METHODS

### Advertising Data

Nielsen Media Research provided data on the occurrence of all smoking-related advertisements that appeared on network and cable television across the largest 75 US television media market areas during 1999–2002. These 75 markets accounted for 78% of American viewing households.<sup>14</sup> A media market is defined by a group of nonoverlapping counties forming a major metropolitan area. Data are on the basis of individual ratings of television programs obtained by monitoring household audiences across media markets. Ratings provide an estimate of the percentage of households with televisions that watch a program or advertisement in a media market

over a specified time interval.<sup>15</sup> The advertising exposure measure used in our study is based on Target Rating Points (TRPs) for the population aged 12–17 years. In these analyses, TRPs were aggregated each month; 100 TRPs are equal to an average of 1 potential advertisement exposure per month for all youth aged 12–17 years within a media market. TRPs represent potential average exposure; actual exposure for any given individual would vary on the basis of actual television viewing. In this study, all the tobacco company parent-targeted advertising was from Philip Morris. However, tobacco company youth-targeted advertising was broadcast by Philip Morris and Lorillard; Philip Morris made up 90.8% of the total TRPs in 1999, 93.0% in 2000, 85.2% in 2001, and 37.5% in 2002.

Monthly TRP data were merged with nationally representative data collected during 1999–2002 from the Monitoring the Future school survey.<sup>16</sup> Data were collected from February to June each year from samples of students in grades 8, 10, and 12, drawn to be representative of all students in the specified grade for the 48 contiguous states. All surveys were self-completed and group-administered in school settings.

### Dependent Variables

Separate analyses were conducted for each of the following self-reported dependent variables: recall of antitobacco advertising at least weekly (1=seeing antitobacco commercials on television or hearing them on the radio at least once a week in recent months); approval of smoking (1=don't disapprove of people smoking  $\geq 1$  pack a day (grades 8 and 10), or don't disapprove of people (aged 18 years or older) smoking  $\geq 1$  pack a day (grade 12); perceived enjoyment of life by smokers (1=no disagreement with the statement that smokers know how to enjoy life more than nonsmokers); preference for dating nonsmokers (1=no preference for dating nonsmokers); perceived exaggeration of smoking harm (1=no disagreement with the statement that the harmful effects of smoking have been exaggerated); perception that being a smoker reflects poor judgment (1=do not agree that being a smoker reflects poor judgment); perception that smoking is a dirty habit (1=do

not agree that smoking is a dirty habit); perceived harm of smoking (1=believe people risk "great harm" to themselves by smoking  $\geq 1$  pack of cigarettes a day); intentions to be smoking in 5 years time (0=definitely will not be smoking cigarettes in 5 years; 1=other<sup>17</sup>); smoking in the past 30 days (1=any cigarette smoking in the past 30 days); and consumption among current smokers, as measured by a 6-point scale: less than 1 cigarette/day (0.5), 1–5 cigarettes/day (3.0), about .5 pack/day (10), about 1 pack/day (20), about 1.5 pack/day (30), and 2 or more packs/day (40). The natural log of this scale was used in all models.<sup>18</sup>

The school survey randomly allocates students to several different forms of survey questionnaires to maximize the number of questions asked of students. Although all students are asked about smoking behavior (current smoking and consumption), only some forms contain questions on recall of advertising, and smoking-related attitudes and intentions. For this reason, different numbers of students respond to each outcome measure. The total number of students included in each model is specified in table footnotes.

### Independent Variables

Advertising exposure for each student was calculated to reflect the cumulative effect of repeated potential exposure to tobacco industry advertising and gave greater weight to more recent exposure.<sup>19–21</sup> Thus, in analyses, individual student potential exposure to tobacco industry advertising was reflected by the sum of TRPs for the month in which the school survey was completed, plus the sum of depreciated TRPs from the 3 previous months. On the basis of the work of Pollay and colleagues,<sup>21</sup> a depreciation value of 0.3 was specified as noted in the equation

$$(1) \text{ Adstock}_t = \text{Ad}_t + \lambda \text{Ad}_{(t-1)} + \lambda^2 \text{Ad}_{(t-2)} + \lambda^3 \text{Ad}_{(t-3)}$$

where Adstock is the total effective advertising,  $\lambda$  is set at the specified value of 0.3 as noted above, and Ad indicates ad sponsor TRPs for time periods  $t$ ,  $t-1$ ,  $t-2$ , and  $t-3$ . A range of values for  $\lambda$  were examined. Because results were highly similar,  $\lambda$  was set at

0.3, consistent with previously published data by Emery and colleagues<sup>22</sup> on the effect of state tobacco control ads. The depreciated sum was scaled by dividing by 100. The resulting TRP exposure value represents the depreciated average number of times that advertising from a particular sponsor was potentially seen by 100% of the youth aged 12–17 years in each media market over the 4 months leading up to each specific school's date of survey participation. Thus, students within the same media market were assigned different advertising exposures, depending on the month in which their school was surveyed. However, within media markets, students in each school were assigned the same advertising exposure values, because they completed the survey on the same date. Smoking-related outcomes were modeled using continuous versions of depreciated TRPs for youth-targeted and parent-targeted advertising.

### Statistical Analyses and Covariates

Our analyses used survey commands in Stata, version 8 (Stata Corp, College Station, Tex) for descriptive population estimates and multivariate regression models (SVYLOGISTIC for dichotomous outcomes; SVYREG for the models of cigarette consumption using the natural log of the consumption scale). The complex multistage sample design was accounted for by using sampling weights to adjust for differential selection probabilities, and by using Taylor linearization-based variance estimators to adjust for clustering by school and compute robust standard errors.

Initially, for each type of tobacco company advertising, we tested several functional forms, including quadratic and threshold models, to explore whether the relations between exposure and outcomes were nonlinear. The linear models fit the data best, and are reported here. Thus, odds ratios refer to change in the likelihood of each outcome measure, on the basis of each additional advertisement viewed, on average, in the 4 months leading up to the date of survey administration.

For tobacco company youth-targeted advertising, we first ran models for all students combined and controlled for (1) competing advertising exposure from 2 types of

campaigns: tobacco control (including state and national American Legacy Foundation campaigns) and tobacco company parent-targeted advertising; (2) individual sociodemographics: gender, race/ethnicity, average parental education, dual parent household, grade point average, 3 or more evenings out a week for fun/recreation, past-month truancy, year, region, and student-earned income; and (3) state tobacco policy variables: average real price per pack of cigarettes<sup>22</sup> and a smoke-free air index measuring the comprehensiveness of state smoke-free laws. The smoke-free air index values depended on the number, type, and level of protection for smoke-free locations, and whether the state had the authority to preempt local smoke-free regulations.<sup>22</sup> On the basis that the primary target group of the tobacco company youth-targeted advertising was youths aged 10–14 years and that middle- (grade 8, mean age 14 years) and high-school (grades 10 and 12, mean ages 16 and 18 years, respectively) students are at very different developmental stages, we ran separate models for grade 8 versus grades 10 and 12. In the model for grades 10 and 12, a dummy variable for grade 12 was also included. This analysis process was repeated to examine the relation between tobacco company parent-targeted advertising and youth smoking outcomes (with the exception that competing advertising exposure for tobacco company youth-targeted advertising was included as a covariate).

We conducted sensitivity analyses to explore the robustness of findings for outcomes of greatest concern. Because advertising and policy variables were correlated, we excluded each tobacco policy variable and tobacco control campaign exposure, to explore if observed relations changed in a systematic way. In addition, we were able to include information on student-reported frequency of television watching as a covariate in models of smoking prevalence and consumption, because these questions occurred on the same survey form as television watching questions for all 3 grades. In this set of analyses, the school survey item measured self-reported average weekday television viewing as a continuous variable (a 7-point scale ranging from 0 to 5+ hours).

## RESULTS

After retaining cases that had no missing data for covariates and at least 1 of the specified dependent variables, 103 172 students remained in the analytic sample; 36% were students in grade 8 and 64% were students in grades 10 and 12. Table 1 shows that 20.8% of the sample population had smoked in the last 30 days and average daily consumption for these smokers was 5.43 cigarettes.

On average, students had been exposed to 4.77 depreciated potential viewings of tobacco company youth-targeted advertising and 1.13 potential viewings of tobacco company parent-targeted advertising in the 4-month period leading up to the survey. As expected from the diverse timing and intensity of these campaigns, there was variation between students, with a range of 0 to 14.51 viewings of tobacco company youth-targeted ads, and a range of 0 to 4.13 viewings of tobacco company parent-targeted ads. There was also variation in exposure to tobacco control campaigns (mean 6.88 viewings; for state antitobacco campaigns, mean=1.66 [range=0–19.14]; for the American Legacy Foundation, mean=5.23 [range=0–21.85]).

After we controlled for covariates, increased exposure to tobacco company youth-targeted advertising among all students was generally unrelated to recall of televised antitobacco advertising or to smoking beliefs or behavior (Table 2). However, on average, each additional ad viewed was associated with a 3% stronger intention to smoke in the future (OR=1.03; CI=1.01, 1.05). When analyzed separately for middle- and high-school students, higher exposure to tobacco company youth-targeted advertising was unrelated to any outcome for students in grades 10 and 12. For students in grade 8, higher exposure was associated with stronger intentions to smoke in the future (OR=1.04; CI=1.01, 1.08). Inclusion of self-reported frequency of television watching as a covariate did not change the finding that there was no relation between increased tobacco company youth-targeted advertising and smoking in the past 30 days, or consumption among smokers. (Data for students who smoked in the past 30 days: all students OR=0.99; CI=0.96, 1.01; grade 8 OR=0.99; CI=0.95, 1.04; grades 10

and 12 OR=0.99; CI=0.96, 1.01. Data for consumption among smokers: all students Parameter estimate=-.008,  $P>.05$ ; grade 8 Parameter estimate=-.014,  $P>.05$ ; grades 10 and 12 Parameter estimate=-.004,  $P>.05$ .)

After adjusting for covariates, Table 2 shows that among all students combined, each additional tobacco industry parent-targeted ad was associated with a lower likelihood of recalling antitobacco advertising (OR=0.87; CI=0.82, 0.92), lower perceived harm of smoking (OR=0.95; CI=0.92, 1.00), stronger intentions to smoke in future (OR=1.12; CI=1.05, 1.19), and a greater likelihood of smoking in the past 30 days (OR=1.10; CI=1.03, 1.17).

Separate models for middle- and high-school students indicated that, among students in grade 8, greater tobacco company parent-targeted advertising exposure was related to lower odds of recalling antitobacco advertising (OR=0.86; CI=0.78, 0.94), a greater likelihood of perceiving the harms associated with smoking have been exaggerated (OR=1.07; CI=1.01, 1.13), and stronger intentions to smoke in the future (OR=1.10; CI=1.00, 1.21). Among students in grades 10 and 12, higher advertising exposure was also associated with less likelihood of recalling antitobacco advertising (OR=0.86; CI=0.80, 0.94), stronger approval of smoking (OR=1.11; CI=1.03, 1.20), lower perceived harm of smoking (OR=0.93; CI=0.88, 0.98), stronger intentions to smoke in future (OR=1.12; CI=1.04, 1.21), and a greater likelihood of smoking in the past 30 days (OR=1.12; CI=1.04, 1.19). Each additional ad exposure during the 4 months leading up to survey administration, on average, was associated with a 12% increase in the likelihood that students in grades 10 and 12 had smoked in the past 30 days.

In sensitivity analyses among students in grades 10 and 12, where relations of most concern were found, exclusion of cigarette price or strength of smoke-free air index generally did not systematically influence the relation between increasing tobacco company parent-targeted advertising and stronger approval of smoking, lower perceived harm of smoking, stronger intentions to smoke in the future, or greater likelihood of smoking in the past 30 days (Table 3). When tobacco-control

**TABLE 1—Sample Characteristics of US School Students in 8th, 10th, and 12th Grade: 1999–2002**

	Weighted No.	Percentage	Mean
<b>Independent control variables (N = 103 172)<sup>a</sup></b>			
Middle school (grade 8)		36.0	
High school (grades 10 and 12)		64.0	
Male		47.3	
Race/ethnicity			
White		71.6	
African American		12.0	
Hispanic		10.9	
Other		5.5	
Lives with both parents		75.0	
Regularly out $\geq 3$ nights/wk		44.5	
Skipped or cut school in the past month		19.4	
Earned income, \$			1–15/wk (median)
Parental education (range: 1–6) <sup>b</sup>			3.99
Average school grade (range: 1–9) <sup>c</sup>			6.22
Real price/pack of cigarettes, \$ (range: \$1.32–\$2.86)			1.92
Smoke-free air index (range: –22.50–51.00)			13.15
Region			
Northeast		21.5	
Midwest		28.0	
West		18.8	
South		31.7	
<b>Independent variables (N = 103 172)<sup>a</sup></b>			
Average tobacco industry parent-targeted exposure <sup>d</sup> (range: 0.00–4.13)			1.13
Average tobacco industry youth-targeted exposure <sup>d</sup> (range: 0.09–14.51)			4.77
Average tobacco control exposure <sup>d</sup> (range: 0.00–23.90)			6.88
<b>Dependent variables<sup>e</sup></b>			
Recall antitobacco ads on TV or radio at least weekly (1=yes)	28 768	62.4	
Approve of others/adults smoking $\geq 1$ pack per day (1=yes) <sup>f</sup>	65 388	22.7	
Do not prefer to date nonsmokers (1=yes)	37 645	22.6	
Feel that smokers know how to enjoy life more than nonsmokers (1=yes)	37 685	16.2	
Feel the harmful effects of cigarettes have been exaggerated (1=yes)	37 240	34.2	
Do not feel that being a smoker reflects poor judgment (1=yes)	37 343	39.6	
Do not feel that smoking is a dirty habit (1=yes)	37 320	27.5	
Perceive great harm in smoking $\geq 1$ packs/day (1=yes)	95 952	69.6	
Intend to smoke in 5 years (1=yes)	34 047	39.1	
Smoked in the past 30 days (1=yes)	101 720	20.8	
Consumption frequency among current smokers (.5, 3, 10, 20, 30, 40) <sup>g</sup>	19 581		5.43

<sup>a</sup>Number of students was obtained by retaining only cases with valid data for all independent control variables, and valid data on at least 1 of the specified dependent variables.

<sup>b</sup>Parental education was a scaled value ranging from 1 to 6, and was a combined average of mother's and father's highest level of education, where 1 = grade school or less, 2 = some high school, 3 = high school completion, 4 = some college, 5 = college completion, and 6 = graduate school.

<sup>c</sup>Average school grade was a 9-item scale where 1 = D and 9 = A. A mean of 6 indicates a B.

<sup>d</sup>Exposure to specific ads during the 4 months before the school survey. Advertising exposure data reported at the student level and not at the media market level, because students within the same media market will have different average exposures on the basis of their school survey date.

<sup>e</sup>Possible Ns for dependent variables varied, because not all items were asked of all students.

<sup>f</sup>Students in grades 8 and 10 were asked about disapproval of others' smoking; students in grade 12 were asked about disapproval of adults' smoking.

<sup>g</sup>Consumption was measured by a 6-point scale: less than 1 cigarette/day (0.5), 1–5 cigarettes/day (3.0), about 0.5 pack/day (10), about 1 pack/day (20), about 1.5 pack/day (30), and 2 or more packs/day (40). The natural log of this scale was used in all models.

ad exposure was removed, relations persisted between increasing tobacco company parent-targeted ad exposure and stronger approval of smoking as well as smoking in the past 30 days, but were weakened for perceived harm of smoking and intention to smoke in the future.

When self-reported frequency of television watching was included as a covariate, the relation between tobacco company parent-targeted ad exposure and current smoking was unchanged for students in grade 8 (OR=1.11; CI=0.99, 1.25, not significant) but was strengthened among students in grades 10 and 12 (OR=1.14; CI=1.05, 1.25,  $P<.01$ ). Control for television watching did not change the previously nonsignificant results for cigarette consumption (grade 8: Parameter estimate=–.068,  $P>0.5$ ; grades 10 and 12: Parameter estimate=–.016,  $P>.05$ ).

In models of students in all 3 grade levels, higher cigarette price was associated with lower consumption among current smokers (Parameter estimate=–.002, SE=0.001,  $P<.05$ ), and stronger smoke-free laws were associated with a lower likelihood of smoking in the past 30 days (OR=0.99; CI=0.99, 1.00,  $P=.01$  [data not shown]). In addition, consistent with previous studies,<sup>11,22</sup> we observed expected relations between increasing exposure to tobacco control campaign advertising and higher recall of antitobacco advertising (OR=1.04; CI=1.03, 1.04,  $P<.001$ ), more protective beliefs about smoking (e.g., increased perceived harm of smoking) (OR=1.01; CI=1.00, 1.02,  $P<.01$ ), weakened intentions to smoke in future (OR=0.98; CI=0.97, 0.99,  $P<.001$ ), and a lower likelihood of smoking in the past 30 days (OR=0.99; CI=0.98, 1.00,  $P<.01$ ).

## DISCUSSION

Overall, we found no systematic associations between increased exposure to tobacco company youth-targeted smoking prevention advertising and smoking outcomes among American youths. We found that increased exposure to tobacco company parent-targeted smoking prevention advertising was associated with lower recall of antitobacco advertising and stronger intentions to smoke in the future for all students. Among students in grade 8,



**TABLE 2—Odds Ratios for Each Unit Increase in Number of Ads Viewed, With 95% Confidence Intervals (CIs), for Smoking-Related Beliefs and Behavior and Tobacco Industry Smoking Prevention Advertising Exposure: 1999–2002**

	Exposure, All Students <sup>a</sup>		Exposure, 8th Grade Students <sup>b</sup>		Exposure, 10th and 12th Grade Students <sup>c</sup>	
	Youth-Targeted <sup>d</sup>	Parent-Targeted <sup>e</sup>	Youth-Targeted <sup>d</sup>	Parent-Targeted <sup>e</sup>	Youth-Targeted <sup>d</sup>	Parent-Targeted <sup>e</sup>
Recall antitobacco ads on TV or radio at least weekly	1.00 (0.98, 1.02)	0.87*** (0.82, 0.92)	0.99 (0.96, 1.02)	0.86** (0.78, 0.94)	1.01 (0.98, 1.03)	0.86** (0.80, 0.94)
Approve of others/adults smoking $\geq 1$ pack/day <sup>f</sup>	0.98 (0.95, 1.00)	1.06 (0.99, 1.13)	0.98 (0.95, 1.01)	1.03 (0.96, 1.12)	0.98 (0.96, 1.01)	1.11** (1.03, 1.20)
Do not prefer to date nonsmokers	1.00 (0.97, 1.02)	1.04 (0.97, 1.11)	1.00 (0.96, 1.04)	1.05 (0.94, 1.18)	0.99 (0.97, 1.02)	1.03 (0.96, 1.11)
Feel that smokers know how to enjoy life more than nonsmokers	1.00 (0.98, 1.03)	1.00 (0.94, 1.07)	1.02 (0.98, 1.06)	1.07 (0.96, 1.19)	0.99 (0.97, 1.02)	0.94 (0.87, 1.01)
Feel the harmful effects of cigarettes have been exaggerated	1.00 (0.98, 1.02)	1.03 (0.99, 1.08)	1.01 (0.98, 1.03)	1.07* (1.01, 1.13)	0.99 (0.96, 1.01)	0.99 (0.93, 1.06)
Do not feel that being a smoker reflects poor judgment	0.99 (0.97, 1.01)	0.99 (0.94, 1.04)	0.98 (0.95, 1.01)	1.02 (0.95, 1.09)	0.99 (0.97, 1.02)	0.96 (0.90, 1.03)
Do not feel that smoking is a dirty habit	1.00 (0.98, 1.02)	1.00 (0.94, 1.07)	1.00 (0.96, 1.03)	1.01 (0.92, 1.10)	1.01 (0.98, 1.03)	0.99 (0.91, 1.07)
Perceive great harm in smoking $\geq 1$ packs/day	0.99 (0.98, 1.01)	0.95* (0.92, 1.00)	0.99 (0.97, 1.01)	0.98 (0.93, 1.04)	1.00 (0.98, 1.02)	0.93** (0.88, 0.98)
Intend to smoke in 5 years	1.03** (1.01, 1.05)	1.12** (1.05, 1.19)	1.04* (1.01, 1.08)	1.10* (1.00, 1.21)	1.01 (0.99, 1.04)	1.12** (1.04, 1.21)
Smoked in past 30 days	0.99 (0.97, 1.01)	1.10** (1.03, 1.17)	0.99 (0.95, 1.04)	1.11 (0.99, 1.25)	0.99 (0.97, 1.01)	1.12** (1.04, 1.19)
Consumption frequency among current smokers, <sup>g</sup> parameter estimate (SE)	-.014; (.008)	.019 (.025)	-.014 (.015)	.069 (.044)	-.012 (.009)	.018 (.028)

Note. All models controlled for tobacco control advertising exposure, either tobacco company parent-targeted or youth-targeted advertising exposure, year, gender, race/ethnicity, earned income, average parental education, whether both parents live in the home, grade point average, evenings out, truancy, region, state cigarette price, and state smoke-free air index values.

<sup>a</sup>All students model Ns (weighted): smoked in last 30 days 101 720; perceived harm 95 952; disapproval 65 388; recall 28 768; consumption 21 138; remaining perception models range from 34 047 to 37 685.

<sup>b</sup>Grade 8 model Ns (weighted): smoked in last 30 days 36 382; perceived harm 36 236; disapproval 23 305; recall 12 136; consumption 4 621; remaining perception models range from 12 287 to 16 688.

<sup>c</sup>Grades 10 and 12 model Ns (weighted): smoked in last 30 days 65 338; perceived harm 59 716; disapproval 42 083; recall 16 632; consumption 16 517; remaining perception models range from 20 827 to 21 760. A dummy variable identifying students in grade 12 was included in these models.

<sup>d</sup>Tobacco company youth-targeted ads sponsored primarily by Philip Morris, and by Lorillard Tobacco Company.

<sup>e</sup>Tobacco company parent-targeted ads sponsored by Philip Morris.

<sup>f</sup>Students in grades 8 and 10 asked about disapproval of others' smoking; 12th grade students asked about disapproval of adults' smoking.

<sup>g</sup>Consumption measured by a 6-point scale: less than 1 cigarette/day (0.5), 1–5 cigarettes/day (3.0), about 0.5 pack/day (10), about 1 pack/day (20), about 1.5 pack/day (30), and 2 or more packs/day (40). The natural log of this scale was used in all models.

\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ .

**TABLE 3—Odds Ratios and 95% Confidence Intervals for Tobacco Company Parent-Targeted Advertising Exposure and Selected Smoking Outcomes Among Students in Grades 10 and 12: 1999–2002**

Model <sup>a</sup>	Weighted No.	Excluding State Cigarette Price	Excluding State Smoke-Free Air Index Value	Excluding Tobacco Control Ad Exposure
Approve of others/adults smoking $\geq 1$ pack/day <sup>b</sup>	42 083	1.10* (1.02, 1.18)	1.11** (1.03, 1.21)	1.10** (1.04, 1.17)
Perceive great harm in smoking $\geq 1$ packs/day	59 716	0.95 (0.90, 1.01)	0.93** (0.88, 0.98)	0.97 (0.93, 1.01)
Intend to smoke in 5 years	21 760	1.12** (1.04, 1.20)	1.13** (1.05, 1.22)	1.04 (0.98, 1.10)
Smoked in past 30 days	65 338	1.10** (1.03, 1.18)	1.12** (1.05, 1.20)	1.07** (1.02, 1.12)

<sup>a</sup>Tobacco company parent-targeted ads sponsored by Philip Morris. All models controlled for year, gender, race/ethnicity, earned income, average parental education, whether both parents live in the home, average school grade, evenings out, truancy, region, and dummy variable for students in grade 12. Unless specified above, models also controlled for tobacco control advertising exposure, either tobacco company parent-directed or youth-targeted advertising exposure, state cigarette price, and state smoke-free air index values.

<sup>b</sup>Students in grade 10 were asked about disapproval of others' smoking; students in grade 12 were asked about disapproval of adults' smoking.

\* $P < .05$ ; \*\* $P < .01$ .

tobacco company parent-targeted advertising was related to stronger beliefs that the harms associated with smoking have been exaggerated, and among students in grades 10 and 12, was associated with lower perceived harm

of smoking, stronger approval of smoking, and a higher likelihood of having smoked in the past 30 days. Importantly, the results for smoking prevalence among students in grades 10 and 12 were not systematically influenced

by correlations between price and strength of smoke-free air laws, or tobacco control advertising exposure, although some models were less robust when tobacco control ad exposure was removed as a covariate.

Our study did have limitations. Our use of cross-sectional survey data reduced our ability to make direct causal inferences about whether potential exposure to tobacco company parent-targeted advertising resulted in changes to youth smoking behavior, or whether an unmeasured factor may better explain the relations we observed. However, our ability to adjust for competing advertising exposures, our use of regional and year dummy variables, our sensitivity analyses, and the fact that we observed results for tobacco policy<sup>23,24</sup> and other advertising covariates<sup>11,22</sup> that were largely consistent with those found in previous studies, lead us to believe that it is unlikely that we are misrepresenting the relation between exposure to tobacco company youth-targeted or parent-targeted advertising and youth smoking outcomes. An alternate hypothesis is that tobacco companies may have purposefully purchased parent-targeted advertising in media markets that have higher youth smoking rates. This seems unlikely, however, given that the vast majority of their television time was bought through national network and cable channels and was not supplemented by the purchase of local media market television time. In addition, although the study had a large sample size, which makes differences between groups more likely to achieve statistical significance, the overall consistency in the pattern and robustness of findings leads one to conclude that the detected relations are real.

As previously mentioned, another study limitation is that because TRPs measure average exposure for the overall population in a media market, individual youths may have more or less actual exposure, depending upon their own viewing habits. However, when we adjusted for self-reported television watching, the relations between tobacco company youth-targeted and parent-targeted advertising and smoking in the past 30 days did not change for students in grade 8 and strengthened for students in grades 10 and 12. Previous studies of antitobacco and antidrug advertising have found a strong correlation between advertising recall and TRP measures.<sup>22,25</sup>

Studies that use controlled exposure have indicated that tobacco company youth-targeted advertisements are less likely than those from state tobacco control programs to

make youths stop and think about smoking<sup>10</sup> and are of less interest to youths.<sup>26</sup> In 1 national study, Philip Morris “Think. Don’t Smoke” advertisements were associated with increased intention to smoke and more favorable feelings towards the tobacco industry.<sup>6</sup> Massachusetts youths aged 14–17 who recalled seeing Philip Morris’ “Think. Don’t Smoke” ads perceived them to be less effective than ads that featured the serious consequences of smoking.<sup>8</sup> Our finding of no relation between tobacco company youth-targeted advertising and youth smoking substantiates these previous results. Although tobacco company youth-targeted advertising was withdrawn from US television in early 2003, ads continue to be broadcast in other countries, contributing “clutter” to other public health–sponsored advertising efforts<sup>12</sup> that have been shown to be effective.<sup>11,22,27</sup>

Our finding of potentially harmful relations between tobacco company parent-targeted smoking prevention advertising and youth smoking is a source of concern. Our observation of adverse relations associated with parent-targeted advertising is not simply an artifact of our methodological approach: we have previously reported beneficial relations between exposure to state-sponsored antitobacco advertising and youth smoking beliefs and behavior using the same methods.<sup>22</sup>

Why might such advertising have harmful relations, especially for older teens? Although parents are the overt target group of tobacco company parent-targeted advertising, youths are exposed to them, on average, at levels almost equivalent to those of state-sponsored antitobacco campaigns. The overt message of the parent-targeted campaign is that parents should talk to their children about smoking, but no reason beyond simply being a teenager is offered as to why youths should not smoke.

Theories in developmental psychology suggest that authority messages specific to teenagers invite rejection by those who have migrated to a dominant peer group orientation as they make the transition to adulthood, typically between ages 15 to 17 years.<sup>28,29</sup> As adolescents age toward adulthood, they are more inclined to perceive themselves as independent and self-reliant and less likely to report that they rely on their parents for guidance or

assistance.<sup>28</sup> Evaluations of the US National Anti-Drug Media Campaign, which used messages encouraging parents to talk to their children about illicit drugs, have also reported unfavorable effects on adolescents.<sup>30,31</sup> Facilitating productive interaction between parents and adolescents about substance use may require more intensive intervention approaches than simple encouragement through the mass media, which may do more harm than good.

During depositions and testimony in US-based tobacco trials, tobacco company witnesses put forward their youth smoking prevention efforts as evidence that they are concerned about youth smoking and that the campaigns are part of efforts to reduce youth smoking.<sup>32</sup> However, during questioning at such a trial, Carolyn Levy, director of Philip Morris youth smoking prevention programs, admitted that the aim of their programs was to delay smoking until age 18.<sup>32</sup> This contrasts with the aims of public health-funded programs, which are to encourage people to never take up smoking.

In summary, our analysis suggests that tobacco company youth- and parent-targeted smoking prevention advertising campaigns confer no benefit to youths, and especially for older teens, parent-targeted advertising may have harmful relations. In the United States, youths have the benefit of the national American Legacy Foundation antitobacco campaign, as well as state antitobacco campaigns. The Legacy Foundation’s budget cuts will force it to advertise less in the future,<sup>33</sup> and state antitobacco campaign advertising has begun to decline as a result of reduced state tobacco control funding.<sup>12,34</sup> Many other countries of the world have limited or no public health-sponsored televised antitobacco advertising. Given a media environment that has fewer demonstrably beneficial advertising messages, it is conceivable that tobacco company smoking prevention ads could have even greater adverse effects on youth smoking behavior than suggested by this study. ■

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## Contributors

M. Wakefield conceived and led the study and the writing of the article. Y. Terry-McElrath conducted the analysis and assisted with writing. S. Emery, H. Saffer, F. Chaloupka, B. Flay, P.M. O'Malley, and L.D. Johnston contributed to conception of the study and the analysis and assisted with writing. G. Szczypka undertook data management for the study and assisted with writing.

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## Human Participant Protection

This study was approved by the University of Illinois, Chicago, institutional review board. Use of data from the Monitoring the Future school surveys received ethical approval by the University of Michigan Behavioral Sciences institutional review board.

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